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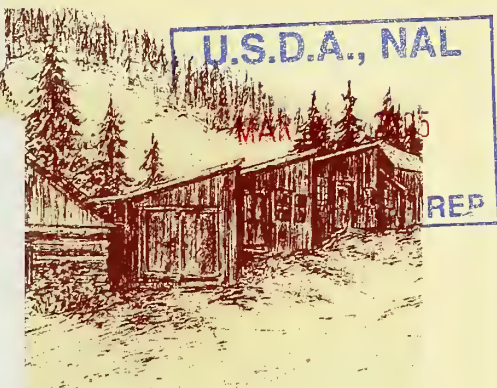
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Charter Oak Mine



FEDERAL
PUBLICATION

Reserve
aTN423
.M9C48
2004



Exploring Montana's Mining History

on the

Helena National Forest

The Mill Process



1. Loadout Deck

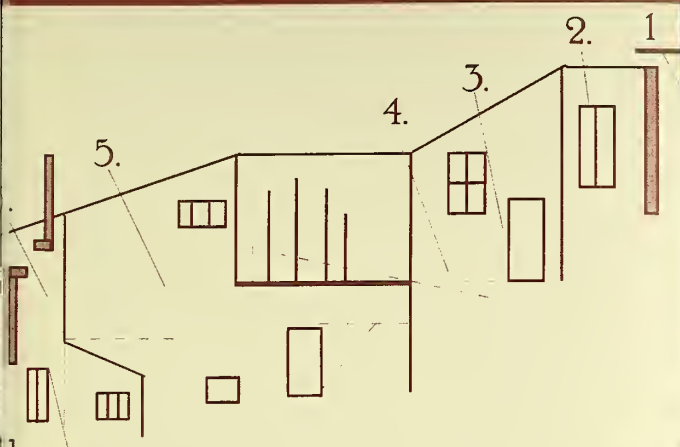
Aerial tram buckets and metal ore carts carried lead and silver ore excavated from 2000 feet of underground workings to wood decks at the top of the mill. Only the upper tram tower ruin has survived. Miners dumped waste rock from their diggings into huge (now partly reclaimed) piles outside of tunnel entrances (adits).

2. First Ore Bin and Chute

On the wood decks, miners emptied the metal-bearing ore into a large, open bin at the top of the mill. Down a chute they tossed over-sized or non-ore bearing rock (gangue).

3. Pacific Jaw Crusher

Inside the mill, ore was shoveled from the bin into a Pacific Jaw Crusher. Its hinged jaw moved forward and away from a stationary jaw, providing immense crushing power. "Cobb" hammers and irons were used to knock off gangue and clear jams. Hands and fingers were at risk when cobbing.



4. Conveyor Belt

A conveyor belt carried the crushed ore to a second ore bin at the center of the mill building. Its drivers were tightened or loosened by a homemade bucket counter-weight filled with scrap iron.

5. Second Ore Bin

The second ore bin, located between the jaw and ball crushers, is still full of coarsely crushed metallic ore ready for further processing.

6. Ore Feed

Depending on coarseness, ore in the second bin was either run through a grizzly screener or fed directly into the ball mill. The vibrating grizzly screened over-sized pieces and sent the sifted ore to the ball mill.

7. Ball Mill

A rotating ball mill, filled with fist-sized steel balls, water and chemicals, thoroughly pulverized the ore concentrate into a fine pulp. This was a very noisy part of the operation. Discarded milling balls can be seen inside and outside the mill building.

8. Rake Classifier

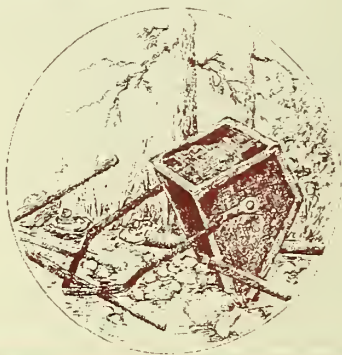
A classifier next to the ball mill raked the ore pulp up and down a long trough. This homemade equipment separated the finely ground ore that was ready for flotation from coarser material that still needed more pulverizing in the ball mill.

9. Denver Sub-A Flotation Cells

Finished pulp was poured from the ball mill into metal flotation tanks or cells, which were infused with water, chemicals and air. Ore particles attached to bubbles as they rose through the cells and collected in a thick froth. Chemicals conditioned the pulp (lime, sulfuric acid), created bubbles (pine oil, cresylic acid), attracted minerals to bubbles (xanthates), and activated (copper sulphate) or depressed (lime, cyanide) flotation of particular minerals.

10. Drying Area-Loading Deck

The froth concentrate was dried, bagged, stored and then sent to the smelter in East Helena. The cells were flushed into a now reclaimed tailings pile on the Little Blackfoot River floodplain below the mill.



Past to Present

1912—The Charter Oak lode claim is located by Fred Hopkins; first silver-lead ore production reported in 1916.

1920s—Annual silver-lead ore production fluctuates widely from 1 to 164 tons.

1930s—Operations cease during the Great Depression.

1940s—Fred Hopkins leases mine to his brother Ralph, who forms Hopkins & Sons Mining Company; operation significantly upgraded to produce critical World War II strategic minerals--lead, zinc and copper.

—Government Order L-208 closes all mines not producing metals for the war effort. These are peak production years at the mine.

1950s—The mine is leased to James T. Bonner, who forms the Charter Oak Mining Company and upgrades the mill equipment. There is intermittent production at the mine. Assaying ores from nearby mines also occurs.

1960s—Last reported ore production.

1970s—Claims above Charter Oak are worked by John Hopkins, son of Ralph Hopkins, Henry Lauri and other Elliston miners.

1980s—The claims and mill are sold to Lee Adams, who unsuccessfully attempts a cyanide heap leach operation.

1990s—Mill tailings spotted in the Little Blackfoot River; the mine complex is given to the Forest Service; reclamation and historic preservation projects completed.

2000s—The site is listed in the National Register of Historic places in 2001 and is open for public visitation.



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Self-guided Walking Tour

The self-guided walking tour follows a loop trail constructed by the Helena High School X-Cel Class. The metal posts demarcate the following various site and mine reclamation features.

- 1—Main residence cabin; once occupied by the Hopkins and Bonner families.
- 2—Old mobile, gas generator (minus the motor); once used to power the mining operation before it was electrified in the 1930s.
- 3—Wood flotation cells; used during the earliest days of the operation.
- 4—French drain; acid discharge from mine adits is partially cleaned by flowing over rock fill in this small ditch, constructed 1998.
- 5—Bone yard; old mining and domestic equipment representing over 60 years of mining activities.
- 6—Adit and mine waste rock dump removed in 1998; discharging tunnel and adit..
- 7—Compressor building; ventilated underground workings and provided power and water for the drills.
- 8—Adit: reconstructed tunnel and adit with mine cart and tracks leading to mill building.
- 9—World War II vintage ball and flotation mill.
- 10—Assay office; used and upgraded for many years.

Improvements to the Charter Oak Mine & Mill site and the production of this trail guide are a result of a cooperative effort between the X-Cel Productions class of Helena High School, the Helena National Forest and the Helena Forest Foundation.

**For more information, please call the
Helena National Forest
at 406-449-5201.**



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